

WHAT IS CLAIMED IS:

1. A method for preventing damage by a pest to a seed and/or shoots and foliage of a plant grown from the seed, the method comprising treating an unsown seed with a composition comprising at least one
5 pyrethrin or synthetic pyrethroid and at least one other insecticide selected from the group consisting of an oxadiazine derivative, a chloronicotinyl, a nitroguanidine, a pyrrol, a pyrazone, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate.

10 2. The method as set forth in claim 1, wherein the at least one other insecticide comprises an oxadiazine derivative, and the pyrethroid is selected from the group consisting of taufluvalinate, flumethrin, trans-cyfluthrin, kadethrin, bioresmethrin, tetramethrin, phenothrin, empenthrin, cyphenothrin, prallethrin, imiprothrin, allethrin and bioallethrin.

15 3. The method as set forth in claim 1 wherein the at least one pyrethrin or synthetic pyrethroid is selected from the group consisting of (s)-cyano(3-phenoxyphenyl)methyl 4-chloro alpha (l-methylethyl)benzeneacetate (fenvalerate); (S)-cyano (3-phenoxyphenyl) methyl (S)-4-chloro-alpha-(1-methylethyl) benzeneacetate (esfenvalerate);
20 (3-phenoxyphenyl)-methyl(+)cis-trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropanecarboxylate (permethrin); (±) alpha-cyano-(3-phenoxyphenyl) methyl(+)-cis,trans-3-(2,2-dichloroethenyl)-2,2-dimethylcyclopropane carboxylate (cypermethrin); (beta-cypermethrin); (theta cypermethrin); S-cyano (3-phenoxyphenyl) methyl (±) cis/trans 3-(2,2-dichloroethenyl) 2,2 dimethylcyclopropane carboxylate (zeta-cypermethrin);
25 (s)-alpha-cyano-3-phenoxybenzyl (1R,3R)-3-(2,2-dibromovinyl)-2,2-dimethyl cyclopropanecarboxylate (deltamethrin); alpha-cyano-3-phenoxybenzyl 2,2,3,3,-tetramethyl cyclopropoanecarboxylate (fenpropathrin); (RS)-alpha-cyano-3-phenoxybenzyl(R)-2-[2-chloro-4-(trifluoromethyl)anilino]-3-methylbutanoate (tau-fluvalinate); (2,3,5,6-tetrafluoro-4-methylphenyl)-methyl-(1 alpha, 3 alpha)-(Z)-(±)-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethylcyclopropanecarboxylate (tefluthrin); (±)-cyano (3-phenoxyphenyl)

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methyl (±)-4-(difluoromethoxy)-alpha-(1-methyl ethyl) benzeneacetate (flucythrinate); cyano(4-fluoro-3-phenoxyphenyl)methyl 3-[2-chloro-2-(4-chlorophenyl)ethenyl]-2,2-dimethylcyclopropanecarboxylate (flumethrin); cyano(4-fluoro-3-phenoxyphenyl) methyl 3-(2,2-dichloroethenyl)-2,2-

5 dimethyl-cyclopropanecarboxylate (cyfluthrin); (beta cyfluthrin); (transfluthrin); (S)-alpha-cyano-3-phenoxybenzyl(Z)-(1R-cis)-2,2-dimethyl-3-[2-(2,2,2-trifluoro-trifluoromethyl-ethoxycarbonyl)vinyl]cyclopropane carboxylate (acrinathrin); (1R cis) S and (1S cis) R enantiomer isomer pair of

10 alpha-cyano-3-phenoxybenzyl-3-(2,2-dichlorovinyl)-2,2-dimethylcyclopropane carboxylate (alphacypermethrin); [1R,3S]3-(1'RS)(1',2',2',2'-tetrabromoethyl)-2,2-dimethyl cyclopropanecarboxylic acid (s)-alpha-cyano-3-phenoxybenzyl ester (tralomethrin); cyano-(3-phenoxyphenyl) methyl 2,2-dichloro-1-(4-

15 ethoxyphenyl)cyclopropane carboxylate (cycloprothrin); [1α, 3α(Z)]-(±)-cyano-(3-phenoxyphenyl)methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-cimethylcyclopropanecarboxylate (cyhalothrin); [1 alpha (s), 3 alpha(z)]-cyano(3-phenoxyphenyl) methyl-3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-

20 dimethylcyclopropane carboxylate (lambda cyhalothrin); (2-methyl [1,1'-biphenyl]-3-yl) methyl 3-(2-chloro-3,3,3-trifluoro-1-propenyl)-2,2-dimethyl-cyclopropanecarboxylate (bifenthrin); 5-1-benzyl-3-furylmethyl-d-

25 cis(1R,3S,E)2,2-dimethyl-3-(2-oxo,-2,2,4,5 tetrahydro thiophenylidenemethyl)cyclopropane carboxylate (kadethrin, RU15525); [5-(phenyl methyl)-3-furanyl]-3-furanyl 2,2-dimethyl-3-(2-methyl-1-propenyl) cyclopropane carboxylate (resmethrin); (1R-trans)-[5-(phenylmethyl)-3-

30 furanyl]methyl 2,2-dimethyl-3-(2-methyl-1-propenyl)cyclopropanecarboxylate (bioresmethrin); 3,4,5,6-tetra hydro-phthalimidomethyl-(1RS)-cis-trans-chrysanthemate (tetramethrin); 3-phenoxybenzyl-d,l-cis,trans 2,2-dimethyl-3-(2-methylpropenyl) cyclopropane carboxylate (phenothrin); (empenthrin); (cyphenothrin); (prallethrin); (imiprothrin); (RS)-3-allyl-2-methyl-4-oxocyclopent-2-enyl-

(1A,3R; 1R,3S)-2,2-dimethyl-3-(2-methylprop-1-enyl) cyclopropane carboxylate (allethrin); (bioallethrin); and (ZXI8901).

4. The method as set forth in claim 3, wherein the synthetic pyrethroid is selected from the group consisting of tefluthrin, lambda cyhalothrin, cyfluthrin and bifenthrin.

5. The method according to claim 2, wherein the pesticide
5 comprises an oxadiazine derivative.

6. The method according to claim 5, wherein the oxadiazine derivative comprises an insecticide selected from the group consisting of 5-(2-chloropyrid-5-ylmethyl)-3-methyl-4-nitroiminoperhydro-1,3,5-oxadiazine, 3-methyl-4-nitroimino-5-(1-oxido-3-pyridinomethyl) perhydro-1,3,5-
10 oxadiazine, 5-(2-chloro-1-oxido-5-pyridiniomethyl)-3-methyl-4-nitroiminoperhydro-1,3,5-oxidiazine, and 3-methyl-5-(2-methylpyrid-5-ylmethyl)-4-nitroiminoperhydro-1,3,5-oxadiazine.

7. The method as set forth in claim 2, wherein the other insecticide comprises a chloronicotinyl.

15 8. The method as set forth in claim 7, wherein the chloronicotinyl is selected from the group consisting of imidacloprid, acetamiprid and nitenpyram.

9. The method as set forth in claim 2, wherein the other insecticide comprises a nitroguanidine.

20 10. The method as set forth in claim 9, wherein the nitroguanidine comprises nidinotefuran.

11. The method as set forth in claim 2, wherein the other insecticide comprises a pyrrol.

25 12. The method as set forth in claim 9, wherein the pyrrol comprises chlorfenapyr.

13. The method as set forth in claim 2, wherein the other insecticide comprises a pyrazone.

14. The method as set forth in claim 13, wherein the pyrazone comprises tebufenpyrad.

30 15. The method as set forth in claim 2, wherein the other insecticide comprises a diacylhydrazine.

16. The method as set forth in claim 15, wherein the diacylhydrazine is selected from the group consisting of tebufenozide, methoxyfenozide and halofenozide.

5 17. The method as set forth in claim 2, wherein the other insecticide comprises a triazole.

18. The method as set forth in claim 17, wherein the triazole comprises triazamate.

19. The method as set forth in claim 2, wherein the other insecticide comprises a biological/fermentation product.

10 20. The method as set forth in claim 19, wherein the biological/fermentation product comprises avermectin or spinosad.

21. The method as set forth in claim 2, wherein the other insecticide comprises a phenyl pyrazone.

15 22. The method as set forth in claim 21, wherein the phenyl pyrazone comprises fiprinol.

23. The method as set forth in claim 2, wherein the other insecticide comprises an organophosphate.

20 24. The method as set forth in claim 23, wherein the organophosphate is selected from the group consisting of acephate, fenamiphos, diazinon, chlorpyrifos, chlorpyrifon-methyl and malathion.

25 25. The method as set forth in claim 2, wherein the other insecticide comprises a carbamate.

26. The method as set forth in claim 25, wherein the carbamate is selected from carbaryl, aldicarb, carbofuran, thiodicarb and oxamyl.

25 27. The method as set forth in claim 2, wherein the composition is included in a seed coating.

28. The method as set forth in claim 2, wherein at least one of the pyrethroid and the other insecticide is a systemic insecticide.

30 29. The method as set forth in claim 2, wherein the seed is treated with the composition of the pyrethroid and the other insecticide in an amount effective to provide protection to the seed and/or the shoots and foliage of the plant against damage by the pest.

30. The method as set forth in claim 2, wherein the seed is treated with the pyrethroid at the same time that it is treated with the other insecticide.

5 31. The method as set forth in claim 2, wherein the seed is treated with the pyrethroid at a different time than it is treated with the other insecticide.

32. The method as set forth in claim 29, wherein the composition is included in a seed coating.

10 33. A seed that has been treated with the method as set forth in claim 1.

34. The seed as set forth in claim 33, wherein the seed is selected from the group consisting of corn, soybean, cotton, rice, sorghum, sugar beet, wheat, barley, rye, sunflower, tomato, sugarcane, tobacco, rape and oats.

15 35. The seed as set forth in claim 34, wherein the seed is selected from the group consisting of corn, soybean and cotton seed.

36. The seed as set forth in claim 35, wherein the seed is corn seed.

20 37. The seed as set forth in claim 33, wherein the seed is a transgenic seed.

38. The seed as set forth in claim 37, wherein the transgenic seed is a transgenic corn seed containing a heterologous *Bacillus thuringiensis* gene.

25 39. The seed as set forth in claim 38, wherein the heterologous *Bacillus thuringiensis* gene is one that encodes for the production of a modified Cry3Bb delta-endotoxin.

30 40. A composition for the treatment of unsown seed comprising at least one pyrethrin or synthetic pyrethroid and at least one other insecticide selected from the group consisting of an oxadiazine derivative, a chloronicotinyl, a nitroguanidine, a pyrrol, a pyrazole, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate.

41. The composition as set forth in claim 40, wherein the at least one other insecticide is an oxadizine derivative, and the pyrethroid is selected from the group consisting of taufluvalinate, flumethrin, trans-cyfluthrin, kadethrin, bioresmethrin, tetramethrin, phenothrin, empenethrin, cyphenothrin, prallethrin, imiprothrin, allethrin and bioallethrin.

42. A method for preventing damage by a pest to a seed and/or shoots and foliage of a plant grown from the seed, the method comprising treating the unsown seed with a composition comprising a nitroguanidine and at least one other insecticide selected from the group consisting of a chloronicotinyl, a pyrrol, a pyrazone, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate.

43. A seed that has been treated by the method as set forth in claim 42.

44. The seed as set forth in claim 43, wherein the seed is selected from the group consisting of corn, soybean, cotton, rice, sorghum, sugar beet, wheat, barley, rye, sunflower, tomato, sugarcane, tobacco, rape and oats.

45. The seed as set forth in claim 44, wherein the seed is corn seed.

46. The seed as set forth in claim 43, wherein the seed is a transgenic seed.

47. A composition for seed treatment prior to sowing comprising a nitroguanidine and at least one other insecticide selected from the group consisting of a chloronicotinyl, a pyrrol, a pyrazone, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate.

48. A seed that is protected against multiple pests comprising a seed having at least one heterologous gene encoding for the expression of a protein that is active against a first pest and, in addition, having adhered thereto a composition comprising at least one pyrethrin or synthetic pyrethroid and at least one other insecticide selected from the group

consisting of an oxadiazine derivative, a chloronicotinyl, a nitroguanidine, a pyrrol, a pyrazone, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate, where the composition is present in an amount effective to provide protection to the shoots and foliage of the plant against damage by at least one second pest.

49. The seed as set forth in claim 48, wherein the at least one heterologous gene encodes for the expression of a protein that is insecticidally active.

50. The seed as set forth in claim 49, wherein the gene is one originally derived from a microorganism selected from the group consisting of *Bacillus*, *Rhizobium*, *Pseudomonas*, *Serratia*, *Trichoderma*, *Glomus*, *Gliocladium* and mycorrhizal fungi.

51. The seed as set forth in claim 50, wherein the protein is active against corn root worm.

52. The seed as set forth in claim 50, wherein the protein is active against european corn borer.

53. The seed as set forth in claim 52 wherein the gene is one originally derived from *Bacillus thuringiensis*.

54. The seed as set forth in claim 50, wherein the seed is selected from the group consisting of corn, soybean, cotton, rice, sorghum, sugar beet, wheat, barley, rye, sunflower, tomato, sugarcane, tobacco, rape and oats.

55. A method for treating an unsown seed to prevent damage by a pest to the seed and/or shoots and foliage of a plant grown from the seed, the method comprising contacting the unsown seed with a composition comprising at least one pyrethrin or synthetic pyrethroid and at least one other insecticide selected from the group consisting of a chloronicotinyl, a nitroguanidine, a pyrrol, a pyrazone, a diacylhydrazine, a triazole, a biological/fermentation product, a phenyl pyrazole, an organophosphate and a carbamate.